

Rec'd PCT/PTO 16 DEC 2004

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
31 December 2003 (31.12.2003)

PCT

(10) International Publication Number
WO 2004/000316 A1

(51) International Patent Classification⁷: A61K 31/44,
31/4439, A61P 1/04

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(21) International Application Number:
PCT/US2003/016223

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU,
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU,
CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,
GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,
LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW,
MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC,
SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG,
US, UZ, VC, VN, YU, ZA, ZM, ZW.

(22) International Filing Date: 19 June 2003 (19.06.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
0201943-8 20 June 2002 (20.06.2002) SE

(84) Designated States (*regional*): ARIPO patent (GH, GM,
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),
Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,
ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO,
SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM,
GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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Published:

— with international search report

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*For two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.*

(54) Title: USE OF MGLUR5 ANTAGONISTS FOR THE TREATMENT OF GERD

(57) Abstract: The present invention relates to the use of metabotropic glutamate receptor 5 antagonists for the inhibition of transient lower esophageal sphincter relaxations. A further aspects of the invention is directed to the use of metabotropic glutamate receptor 5 antagonists for the treatment of gastro, esophageal reflux disease, as well as for the treatment of regurgitation and asthma.

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10/517869
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USE OF MGLUR5 ANTAGONISTS FOR THE TREATMENT OF GERD

Field of the invention

- 5 The present invention relates to the use of metabotropic glutamate receptor 5 (mGluR5) antagonists for the inhibition of transient lower esophageal sphincter relaxations. A further aspect of the invention is directed to the use of metabotropic glutamate receptor 5 antagonists for the treatment of gastro-esophageal reflux disease, as well as for the treatment of regurgitation.

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Background of the invention

- The metabotropic glutamate receptors (mGluR) are G-protein coupled receptors that are involved in the regulation and activity of many synapses in the central nervous system (CNS). Eight metabotropic glutamate receptor subtypes have been identified and are subdivided into three groups based on sequence similarity. Group I consists of mGluR1 and mGluR5. These receptors activate phospholipase C and increase neuronal excitability. Group II, consisting of mGluR2 and mGluR3 as well as group III, consisting of mGluR4, mGluR6, mGluR7 and mGluR8 are capable of inhibiting adenylyl cyclase activity and reduce synaptic transmission. Several of the receptors also exist in various isoforms, occurring by alternative splicing (*Chen, C-Y et al., Journal of Physiology (2002), 538.3, pp. 773-786; Pin, J-P et al., European Journal of Pharmacology (1999), 375, pp. 277-294; Bräuner-Osborne, H et al. Journal of Medicinal Chemistry (2000), 43, pp. 2609-2645; Schoepp, D.D, Jane D.E. Monn J.A. Neuropharmacology (1999), 38, pp. 1431-1476*).

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The lower esophageal sphincter (LES) is prone to relaxing intermittently. As a consequence, fluid from the stomach can pass into the esophagus since the mechanical barrier is temporarily lost at such times, an event hereinafter referred to as "reflux".

- 30 Gastro-esophageal reflux disease (GERD) is the most prevalent upper gastrointestinal tract disease. Current pharmacotherapy aims at reducing gastric acid secretion, or at neutralizing acid in the esophagus. The major mechanism behind reflux has been considered to depend

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on a hypotonic lower esophageal sphincter. However, e.g. *Holloway & Dent (1990)*
Gastroenterol. Clin. N. Amer. 19, pp. 517-535, has shown that most reflux episodes occur
during transient lower esophageal sphincter relaxations (TLESRs), i.e. relaxations not
triggered by swallows. It has also been shown that gastric acid secretion usually is normal
5 in patients with GERD.

According to *Blackshaw L.A. et al., presentation at the conference Neurogastroenterology*
& Motility, Madison, Wisconsin, 14 November 2001, metabotropic glutamate receptors of
group II and group III, i.e. mGluR2, mGluR3, mGluR4, mGluR6, mGluR7 and mGluR8
10 may be involved in selective inhibitory modulation of peripheral mechanosensory endings.

The object of the present invention was to find a new way for the inhibition of transient
lower esophageal sphincter relaxations (TLESRs), thereby preventing reflux. More
particularly the object of the invention was to find a new and improved way of treating
15 gastro-esophageal reflux disease (GERD), as well as a new and improved way for the
treatment of regurgitation.

Outline of the invention

20 It has now surprisingly been found that metabotropic glutamate receptor 5 (mGluR5)
antagonists are useful for the inhibition of transient lower esophageal sphincter relaxations
(TLESRs), and thus for the treatment of gastro-esophageal reflux disease (GERD).

25 Consequently, the present invention is directed to the use of a metabotropic glutamate
receptor 5 antagonist for the manufacture of a medicament for the inhibition of transient
lower esophageal sphincter relaxations (TLESRs).

A further aspect of the invention is the use of a metabotropic glutamate receptor 5
30 antagonist for the manufacture of a medicament for the prevention of reflux.

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Still a further aspect of the invention is the use of a metabotropic glutamate receptor 5 antagonist for the manufacture of a medicament for the treatment of gastro-esophageal reflux disease (GERD).

5 Effective prevention of regurgitation would be an important way of preventing, as well as curing lung disease due to aspiration of regurgitated gastric contents, and for managing failure to thrive. Thus, a further aspect of the invention is the use of a metabotropic glutamate receptor 5 antagonist for the manufacture of a medicament for the treatment of regurgitation.

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Still a further aspect of the invention is the use of a metabotropic glutamate receptor 5 antagonist for the manufacture of a medicament for the treatment or prevention of lung disease.

15 Another aspect of the invention is the use of a metabotropic glutamate receptor 5 antagonist for the manufacture of a medicament for the management of failure to thrive.

Still a further aspect of the invention is the use of a metabotropic glutamate receptor 5 antagonist for the manufacture of a medicament for the treatment or prevention of asthma, such as reflux-related asthma.

20

Another aspect of the invention is the use of a metabotropic glutamate receptor 5 antagonist for the manufacture of a medicament for the treatment or prevention of chronic laryngitis.

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A further aspect of the present invention is a method for the inhibition of transient lower esophageal sphincter relaxations (TLESRs), whereby a pharmaceutically and pharmacologically effective amount of a metabotropic glutamate receptor 5 antagonist is administered to a subject in need of such inhibition.

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Another aspect of the invention is a method for the prevention of reflux, whereby a pharmaceutically and pharmacologically effective amount of a metabotropic glutamate receptor 5 antagonist is administered to a subject in need of such prevention.

5 Still a further aspect of the invention is a method for the treatment of gastro-esophageal reflux disease (GERD), whereby a pharmaceutically and pharmacologically effective amount of a metabotropic glutamate receptor 5 antagonist is administered to a subject in need of such treatment.

10 Yet another aspect of the invention is a method for the treatment of regurgitation, whereby a pharmaceutically and pharmacologically effective amount of a metabotropic glutamate receptor 5 antagonist is administered to a subject in need of such treatment.

15 Still a further aspect of the invention is a method for the treatment or prevention of asthma, such as reflux-related asthma, whereby a pharmaceutically and pharmacologically effective amount of a metabotropic glutamate receptor 5 antagonist is administered to a subject in need of such treatment.

20 Yet another aspect of the invention is a method for the treatment of chronic laryngitis, whereby a pharmaceutically and pharmacologically effective amount of a metabotropic glutamate receptor 5 antagonist is administered to a subject in need of such treatment.
Still a further aspect of the invention is a method for the treatment or inhibition of lung disease, whereby a pharmaceutically and pharmacologically effective amount of a
25 metabotropic glutamate receptor 5 antagonist is administered to a subject in need of such treatment.

Still a further aspect of the invention is a method for the management of failure to thrive, whereby a pharmaceutically and pharmacologically effective amount of a metabotropic
30 glutamate receptor 5 antagonist is administered to a subject in need of such treatment.

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For the purpose of this invention, the term "antagonist" should be understood as including full antagonists, inverse agonists, non-competitive antagonists or competitive antagonists, as well as partial antagonists, whereby a "partial antagonist" should be understood as a compound capable of partially, but not fully, in-activating the metabotropic glutamate receptor 5.

The wording "TLESR", transient lower esophageal sphincter relaxations, is herein defined in accordance with *Mittal, R.K., Holloway, R.H., Penagini, R., Blackshaw, L.A., Dent, J., 1995; Transient lower esophageal sphincter relaxation. Gastroenterology 109, pp. 601-610.*

The wording "reflux" is defined as fluid from the stomach being able to pass into the esophagus, since the mechanical barrier is temporarily lost at such times.

The wording "GERD", gastro-esophageal reflux disease, is defined in accordance with *van Heerwarden, M.A., Smout A.J.P.M., 2000; Diagnosis of reflux disease. Baillière's Clin. Gastroenterol. 14, pp. 759-774.*

One example of a compound having antagonistic affinity to metabotropic glutamate receptor 5, thereby being useful in accordance with the invention, is the compound 2-methyl-6-(phenylethynyl)-pyridine (often abbreviated MPEP). MPEP is commercially available from e.g. Tocris, or may be synthesized according to well-known procedures such as disclosed by K. Sonogashira et al. in *Tetrahedron Lett. (1975), 50, 4467-4470.*

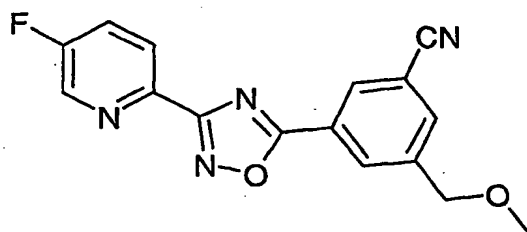
A further example of a compound having antagonistic affinity to metabotropic glutamate receptor 5, thereby being useful in accordance with the invention, is the compound 3-[3-(5-fluoropyridin-2-yl)-1,2,4-oxadiazol-5-yl]-5-(methoxymethyl)benzonitrile, having the structural formula:

30

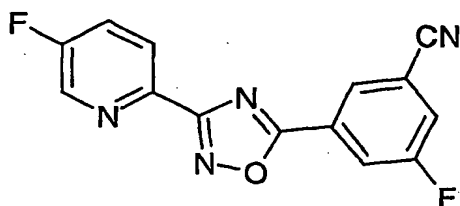
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Yet another example of a compound having antagonistic affinity to metabotropic glutamate receptor 5, thereby being useful in accordance with the invention, is the compound 3-fluoro-5-[3-(5-fluoropyridin-2-yl)-1,2,4-oxadiazol-5-yl]benzonitrile, having the structural formula:



- 10 The use of pharmaceutically acceptable salts of metabotropic glutamate receptor 5 antagonists is also within the scope of the present invention. Such salts are for example salts formed with mineral acids such as hydrochloric acid; alkali metal salts such as sodium or potassium salts; or alkaline earth metal salts such as calcium or magnesium salts.
- 15 Metabotropic glutamate receptor 5 antagonists having an asymmetric carbon atom are chiral compounds, and depending on the presence of asymmetric atoms, the metabotropic glutamate receptor 5 antagonists may exist in the form of mixtures of isomers, particularly racemates, or in the form of pure isomers such as specific enantiomers. The use of optical isomers of metabotropic glutamate receptor 5 antagonists is also within the scope of the
- 20 present invention.

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Pharmaceutical formulations

For clinical use, the metabotropic glutamate receptor 5 antagonists are in accordance with the present invention suitably formulated into pharmaceutical formulations for oral
5 administration. Also rectal, parenteral or any other route of administration may be contemplated to the skilled man in the art of formulations. Thus, the metabotropic glutamate receptor 5 antagonists are formulated with at least one pharmaceutically and pharmacologically acceptable carrier or adjuvant. The carrier may be in the form of a solid, semi-solid or liquid diluent.

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In the preparation of oral pharmaceutical formulations in accordance with the invention, the metabotropic glutamate receptor 5 antagonist(s) to be formulated is mixed with solid, powdered ingredients such as lactose, saccharose, sorbitol, mannitol, starch, amylopectin, cellulose derivatives, gelatin, or another suitable ingredient, as well as with disintegrating
15 agents and lubricating agents such as magnesium stearate, calcium stearate, sodium stearyl fumarate and polyethylene glycol waxes. The mixture is then processed into granules or compressed into tablets.

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Soft gelatine capsules may be prepared with capsules containing a mixture of the active compound or compounds of the invention, vegetable oil, fat, or other suitable vehicle for soft gelatine capsules. Hard gelatine capsules may contain the active compound in combination with solid powdered ingredients such as lactose, saccharose, sorbitol, mannitol, potato starch, corn starch, amylopectin, cellulose derivatives or gelatine.

25

Dosage units for rectal administration may be prepared (i) in the form of suppositories which contain the active substance(s) mixed with a neutral fat base; (ii) in the form of a gelatine rectal capsule which contains the active substance in a mixture with a vegetable oil, paraffin oil, or other suitable vehicle for gelatine rectal capsules; (iii) in the form of a ready-made micro enema; or (iv) in the form of a dry micro enema formulation to be
30 reconstituted in a suitable solvent just prior to administration.

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Liquid preparations for oral administration may be prepared in the form of syrups or suspensions, e.g. solutions or suspensions, containing the active compound and the remainder of the formulation consisting of sugar or sugar alcohols, and a mixture of ethanol, water, glycerol, propylene glycol and polyethylene glycol. If desired, such liquid preparations may contain colouring agents, flavouring agents, saccharine and carboxymethyl cellulose or other thickening agent. Liquid preparations for oral administration may also be prepared in the form of a dry powder to be reconstituted with a suitable solvent prior to use.

10

Solutions for parenteral administration may be prepared as a solution of a compound of the invention in a pharmaceutically acceptable solvent. These solutions may also contain stabilizing ingredients and/or buffering ingredients and are dispensed into unit doses in the form of ampoules or vials. Solutions for parenteral administration may also be prepared as a dry preparation to be reconstituted with a suitable solvent extemporaneously before use.

15

In one aspect of the present invention, the metabotropic glutamate receptor 5 antagonists may be administered once or twice daily, depending on the severity of the patient's condition.

20

A typical daily dose of the metabotropic glutamate receptor 5 antagonists is from 0.1 – 100 mg per kg body weight of the subject to be treated, but this will depend on various factors such as the route of administration, the age and weight of the patient as well as of severity of the patient's condition.

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Biological evaluation*Screening for compounds active against TLESR*

- 5 Adult Labrador retrievers of both genders, trained to stand in a Pavlov sling, are used. Mucosa-to-skin esophagostomies are formed and the dogs are allowed to recover completely before any experiments are done.

Motility measurement

- 10 In brief, after fasting for approximately 17 h with free supply of water, a multilumen sleeve/sidehole assembly (Dentsleeve, Adelaide, South Australia) is introduced through the esophagostomy to measure gastric, lower esophageal sphincter (LES) and esophageal pressures. The assembly is perfused with water using a low-compliance manometric
15 perfusion pump (Dentsleeve, Adelaide, South Australia). An air-perfused tube is passed in the oral direction to measure swallows, and an antimony electrode monitored pH, 3 cm above the LES. All signals are amplified and acquired on a personal computer at 10 Hz.

- When a baseline measurement free from fasting gastric/LES phase III motor activity has
20 been obtained, placebo (0.9% NaCl) or test compound is administered intravenously (i.v., 0.5 ml/kg) in a foreleg vein. Ten min after i.v. administration, a nutrient meal (10% peptone, 5% D-glucose, 5% Intralipid, pH 3.0) is infused into the stomach through the central lumen of the assembly at 100 ml/min to a final volume of 30 ml/kg. Immediately following the meal, air is insufflated at 40 ml/min. In an alternative model (Barostat
25 model), the infusion of the nutrient meal is followed by air infusion at a rate of 500 ml/min until a intragastric pressure of 10 ± 1 mmHg is obtained. The pressure is then maintained at this level throughout the experiment using the infusion pump for further air infusion or for venting air from the stomach. The experimental time from start of nutrient infusion to end of air insufflation is 45 min. The procedure has been validated as a reliable means of
30 triggering TLESRs.

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TLESRs is defined as a decrease in lower esophageal sphincter pressure (with reference to intragastric pressure) at a rate of >1 mmHg/s. The relaxation should not be preceded by a pharyngeal signal ≤ 2 s before its onset in which case the relaxation is classified as swallow-induced. The pressure difference between the LES and the stomach should be less than
5 2 mmHg, and the duration of the complete relaxation longer than 1 s.

EXAMPLES

Example 1

10 2-Methyl-6-(phenylethynyl)-pyridine (MPEP) was prepared according to the procedure described by K. Sonogashira et al. in *Tetrahedron Lett.* (1975), 50, 4467-4470. After purification by column chromatography (SiO_2), the hydrochloride salt (the hydrochloride salt of 2-methyl-6-(phenylethynyl)-pyridine is also commercially available from e.g. Tocris) was prepared by introducing HCl(g) to an ice-cooled Et_2O -solution of the product.
15 The hydrochloride salt of MPEP was tested on adult Labrador retrievers of both genders in accordance with the test model described above.

Inhibition of the number of TLESRs was calculated with regard to the five preceding control experiments for each dog, and the results as set out in Tables 1.1 and 1.2 below
20 were achieved.

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Table 1.1 – Standard model

Compound	DOSE [$\mu\text{mol/kg}$]	% INHIBITION \pm SEM (N)
MPEP	1.4	30 \pm 5 (4)
MPEP	4.3	57 \pm 8 (4)
MPEP	8.7	59 \pm 11 (3)

N = number of dogs tested SEM = standard error of mean

Table 1.2 – Standard model

Compound	DOSE [$\mu\text{mol/kg/h}$] <i>infusion during 60 min</i>	% INHIBITION \pm SEM (N)
MPEP	4	32 \pm 13 (4)
MPEP	6	43 \pm 3 (2)

5 N = number of dogs tested SEM = standard error of mean

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EXAMPLE 2

3-[3-(5-fluoropyridin-2-yl)-1,2,4-oxadiazol-5-yl]-5-(methoxymethyl)benzonitrile was prepared according to the procedure described in WO 02/068417. 3-[3-(5-fluoropyridin-2-yl)-1,2,4-oxadiazol-5-yl]-5-(methoxymethyl)benzonitrile was tested on adult Labrador retrievers of both genders in accordance with the barostat model described above.

Table 2.1 – Barostat model

Compound	DOSE [μ mol/kg/h] <i>infusion during 55 min</i>	% INHIBITION \pm SEM (N)
3-[3-(5-fluoropyridin-2-yl)- 1,2,4-oxadiazol-5-yl]-5- (methoxymethyl)benzonitrile	1.1	58 \pm 11 (4)
3-[3-(5-fluoropyridin-2-yl)- 1,2,4-oxadiazol-5-yl]-5- (methoxymethyl)benzonitrile	2.2	83 \pm 17 (2)

N = number of dogs tested SEM = standard error of mean

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EXAMPLE 3

3-fluoro-5-[3-(5-fluoropyridin-2-yl)-1,2,4-oxadiazol-5-yl]benzonitrile was prepared according to the procedure described in WO 01/12627. 3-fluoro-5-[3-(5-fluoropyridin-2-yl)-1,2,4-oxadiazol-5-yl]benzonitrile was tested on adult Labrador retrievers of both genders in accordance with the barostat model described above.

Table 3.1 – Barostat model

Compound	DOSE [$\mu\text{mol/kg/h}$] <i>infusion during 60 min</i>	% INHIBITION \pm SEM (N)
3-fluoro-5-[3-(5-fluoropyridin-2-yl)-1,2,4-oxadiazol-5-yl]benzonitrile	1	70 \pm 4 (3)

N = number of dogs tested SEM = standard error of mean

The results shown in the Examples above, support that metabotropic glutamate receptor 5 antagonists are useful for the inhibition of TLESRs, and thus for the treatment of GERD.

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Claims

1. Use of a metabotropic glutamate receptor 5 antagonist, or a pharmaceutically acceptable salt or an optical isomer thereof, for the manufacture of a medicament for the inhibition of transient lower esophageal sphincter relaxations (TLESRs).
5
2. Use of a metabotropic glutamate receptor 5 antagonist, or a pharmaceutically acceptable salt or an optical isomer thereof, for the manufacture of a medicament for the treatment of gastro-esophageal reflux disease (GERD).
10
3. Use of a metabotropic glutamate receptor 5 antagonist, or a pharmaceutically acceptable salt or an optical isomer thereof, for the manufacture of a medicament for the prevention of reflux.
- 15 4. Use of a metabotropic glutamate receptor 5 antagonist, or a pharmaceutically acceptable salt or an optical isomer thereof, for the manufacture of a medicament for the treatment of, or prevention of, regurgitation.
- 20 5. Use of a metabotropic glutamate receptor 5 antagonist, or a pharmaceutically acceptable salt or an optical isomer thereof, for the manufacture of a medicament for the treatment of, or prevention of, asthma.
6. Use according to claim 5, wherein the asthma is reflux-related asthma.
- 25 7. Use of a metabotropic glutamate receptor 5 antagonist, or a pharmaceutically acceptable salt or an optical isomer thereof, for the manufacture of a medicament for the treatment of, or prevention of, chronic laryngitis.

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8. Use of a metabotropic glutamate receptor 5 antagonist, or a pharmaceutically acceptable salt or an optical isomer thereof, for the manufacture of a medicament for the treatment of, or prevention of, lung disease.
- 5 9. Use of a metabotropic glutamate receptor 5 antagonist, or a pharmaceutically acceptable salt or an optical isomer thereof, for the manufacture of a medicament for managing failure to thrive.
- 10 10. Use according to any one of the preceding claims, wherein the metabotropic glutamate receptor 5 antagonist is 2-methyl-6-(phenylethynyl)-pyridine.
11. Use according to claim 10, wherein the metabotropic glutamate receptor 5 antagonist is the hydrochloride salt of 2-methyl-6-(phenylethynyl)-pyridine.
- 15 12. Use according to any one of claims 1-9, wherein the metabotropic glutamate receptor antagonist is 3-[3-(5-fluoropyridin-2-yl)-1,2,4-oxadiazol-5-yl]-5-(methoxymethyl)benzonitrile.
- 20 13. Use according to any one of claims 1-9, wherein the metabotropic glutamate receptor antagonist is 3-fluoro-5-[3-(5-fluoropyridin-2-yl)-1,2,4-oxadiazol-5-yl]benzonitrile.
- 25 14. Use according to any one of the preceding claims, wherein the daily dose of the metabotropic glutamate receptor 5 antagonist is from 0.1 – 100 mg per kg body weight of the subject to be treated.
- 30 15. A method for the inhibition of transient lower esophageal sphincter relaxations (TLESRs), whereby a pharmaceutically and pharmacologically effective amount of a metabotropic glutamate receptor 5 antagonist, or a pharmaceutically acceptable salt or an optical isomer thereof, is administered to a subject in need of such inhibition.

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16. A method for the treatment of gastro-esophageal reflux disease (GERD), whereby a pharmaceutically and pharmacologically effective amount of a metabotropic glutamate receptor 5 antagonist, or a pharmaceutically acceptable salt or an optical isomer thereof, is administered to a subject in need of such treatment.
17. A method for the prevention of reflux, whereby a pharmaceutically and pharmacologically effective amount of a metabotropic glutamate receptor 5 antagonist, or a pharmaceutically acceptable salt or an optical isomer thereof, is administered to a subject in need of such prevention.
18. A method for the treatment of, or prevention of, regurgitation, whereby a pharmaceutically and pharmacologically effective amount of a metabotropic glutamate receptor 5 antagonist, or a pharmaceutically acceptable salt or an optical isomer thereof, is administered to a subject in need of such treatment or prevention.
19. A method for the prevention of, or treatment of, lung disease, whereby a pharmaceutically and pharmacologically effective amount of a metabotropic glutamate receptor 5 antagonist, or a pharmaceutically acceptable salt or an optical isomer thereof, is administered to a subject in need of such treatment or prevention.
20. A method for managing failure to thrive, whereby a pharmaceutically and pharmacologically effective amount of a metabotropic glutamate receptor 5 antagonist, or a pharmaceutically acceptable salt or an optical isomer thereof, is administered to a subject in need of such management.
21. A method for treatment or prevention of asthma, whereby a pharmaceutically and pharmacologically effective amount of a metabotropic glutamate receptor 5 antagonist, or a pharmaceutically acceptable salt or an optical isomer thereof, is administered to a subject in need of such treatment or prevention.

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22. A method according to claim 21, wherein the asthma is reflux-related asthma.
23. A method for treatment or prevention of chronic laryngitis, whereby a
5 pharmaceutically and pharmacologically effective amount of a metabotropic
glutamate receptor 5 antagonist, or a pharmaceutically acceptable salt or an
optical isomer thereof, is administered to a subject in need of such treatment or
prevention.
- 10 24. A method according to any one of claims 15-23, wherein the metabotropic
glutamate receptor 5 antagonist is 2-methyl-6-(phenylethynyl)-pyridine.
25. A method according to claim 24, wherein the metabotropic glutamate receptor 5
antagonist is the hydrochloride salt of 2-methyl-6-(phenylethynyl)-pyridine.
- 15 26. A method according to any one of claims 15-23, wherein the metabotropic
glutamate receptor 5 antagonist is 3-[3-(5-fluoropyridin-2-yl)-1,2,4-oxadiazol-5-
yl]-5-(methoxymethyl)benzonitrile.
- 20 27. A method according to any one of claims 15-23, wherein the metabotropic
glutamate receptor 5 antagonist is 3-fluoro-5-[3-(5-fluoropyridin-2-yl)-1,2,4-
oxadiazol-5-yl]benzonitrile.
- 25 28. A method according to any one of claims 15-27, wherein the daily dose of the
metabotropic glutamate receptor 5 antagonist is from 0.1 – 100 mg per kg body
weight of the subject to be treated.

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/US 03/16223

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A61K31/44 A61K31/4439 A61P1/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A61K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, BIOSIS, EMBASE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>GASPARINI F ET AL: "2-METHYL-6-(PHENYLETHYNYL)-PYRIDINE (MPEP), A POTENT, SELECTIVE AND SYSTEMICALLY ACTIVE MGLU5 RECEPTOR ANTAGONIST" NEUROPHARMACOLOGY, PERGAMON PRESS, OXFORD, GB, vol. 38, no. 10, October 1999 (1999-10), pages 1493-1503, XP001032948 ISSN: 0028-3908 the whole document</p> <p style="text-align: center;">--- -/--</p>	

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- *G* document member of the same patent family

Date of the actual completion of the international search

27 August 2003

Date of mailing of the international search report

03/09/2003

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Authorized officer

Tard1, C

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 03/16223

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	KNÖPFEL T ET AL: "Metabotropic Glutamate Receptors: Novel targets for drug development" JOURNAL OF MEDICINAL CHEMISTRY, AMERICAN CHEMICAL SOCIETY. WASHINGTON, US, vol. 38, no. 9, 28 April 1995 (1995-04-28), pages 1417-1426, XP000611483 ISSN: 0022-2623 the whole document	
A	WO 01 12627 A (SLASSI ABDELMALIK ;ISAAC METHVIN BENJAMIN (CA); STORMANN THOMAS M) 22 February 2001 (2001-02-22) cited in the application page 8, line 5,6 page 5, line 9-22	
A	US 6 117 908 A (ANDREWS PAUL L R ET AL) 12 September 2000 (2000-09-12) column 1, line 17 -column 2, line 63; claims 1-4	
A	US 5 036 057 A (MARTIN CHRISTOPHER J) 30 July 1991 (1991-07-30) claim 1	
A	WO 99 59612 A (APHTON CORP ;GEVAS PHILIP C (US); GRIMES STEPHEN (US); KARR STEPHE) 25 November 1999 (1999-11-25) page 1, line 7 -page 4, line 31; claim 1	

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FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box I.2

Present claims 1-9, 14-23 and 28 relate to a compound defined by reference to a desirable characteristic or property, namely a metabotropic glutamate receptor 5 antagonist.

The claims cover all compounds having this characteristic or property, whereas the application provides support within the meaning of Article 6 PCT and/or disclosure within the meaning of Article 5 PCT for only a very limited number of such compounds. In the present case, the claims so lack support, and the application so lacks disclosure, that a meaningful search over the whole of the claimed scope is impossible. Moreover, it cannot be excluded that compounds already used for the claimed diseases possess this property.

Consequently, the search has been carried out for those parts of the claims which appear to be clear, supported and disclosed, namely those parts relating to the compounds disclosed in claims 10-13.

The applicant's attention is drawn to the fact that claims, or parts of claims, relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure.

INTERNATIONAL SEARCH REPORT

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Box I. Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☒ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

Although claims 15-28 are directed to a method of treatment of the human/animal body, the search has been carried out and based on the alleged effects of the compound/composition.
2. ☒ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

see FURTHER INFORMATION sheet PCT/ISA/210
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II. Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this International application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International Application No
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